

# Project Fact Sheet

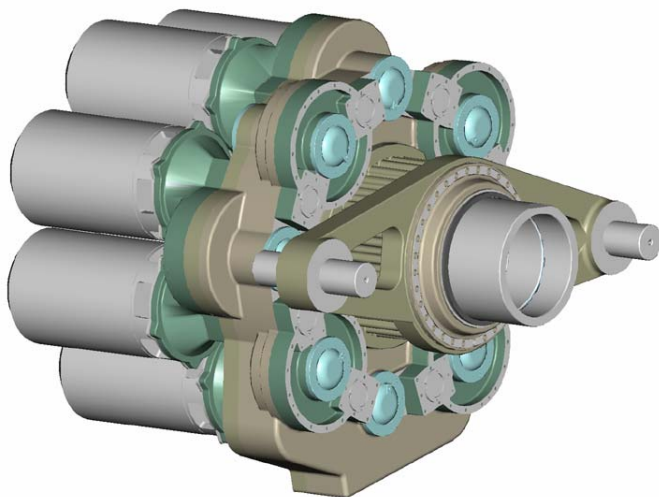
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## *CEC / SMUD Regen Project 4.5:*

### *Distributed Generation Drivetrain for MW Turbines*

#### GOALS

- Engineer a commercially-viable gearbox to either enable cost saving retrofits of existing turbines or provide the drivetrain for a new lighter weight, low cost turbine design;
- Provide full cost-scaling and design tradeoff data for a compact multi-generator gearbox design;
- Construct the DGD system;
- Integrate the DGD controller with a new non-patent infringing variable speed capability
- Load test the DGD system on the NREL dynamometer test stand.



#### PROJECT DESCRIPTION

As wind turbines continue to increase in capacity and rotor diameter, gearbox torque loads and component costs increasing accordingly. New designs are needed for reducing the cost and increasing the reliability of these the large systems. The Distributed Generation Drivetrain (DGD) technology proposes a patent-pending solution to address the exponentially increasing torque loads on large utility-scale turbine drive trains and at the same time include improvements that

decrease system weight and costs. The tremendous load reductions are obtained by splitting the torque along multiple paths at the low speed end of the gearbox between small, parallel gearboxes and multiple off the shelf generators. Extreme loads on individual gear tooth are thereby reduced. These improvements reduce gear teeth wear, gearbox cost and weight, installation requirements, and warranty risks. The focus of the project is to design, construct and test a commercial-scale (1.5MW) DGD along with an integrated controller. The weight savings and torque reduction achieved over current monolithic generator systems will measure project successes.



## **BENEFITS TO CALIFORNIA**

The 1.5MW single stage DGD is projected to cost under \$100,000 compared to \$170,000 for present turbine gearboxes. The innovative gearbox design allows for either a retrofit of existing turbines or provides the drivetrain for a new low-cost turbine design. Through gearing and multiple path load division, the highest gear tooth stresses (found in the first gearbox stage) are substantially reduced resulting in an overall gearbox drivetrain weight and volume reductions. The significant size and weight savings and use of conventional generators provide as much as 0.4¢/kWh cost of energy reductions for wind turbine generators or 10% COE reductions. Benefits to California include a cost-competitive and reliable turbine fleet, lower COE and environmental and economic benefits of using diversified renewable generation technologies.

## **FUNDING AMOUNT**

Commission	\$1,299,000
Match	\$836,000
Project Total	\$ 2,135,000

## **PROJECT STATUS**

Project is currently on track. Preliminary load analysis and design tradeoffs have lead to a optimal gearbox layout and 8 generator configuration. The preliminary DGD design has been finalized and a bill of materials has been sent to gear and gearbox manufacturers, machine shops and foundaries. Preparations are being made for assembly and testing at NREL planned for early 2003.

## **FOR MORE INFORMATION**

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